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# SAVE GRAIN WITH BETTER

# Hay Crops!

U. S. DEPARTMENT OF AGRICULTURE  
Office for Food and Feed Conservation  
Information Supplied by  
Agricultural Research Administration  
Bureau of Dairy Industry

**H**AY CROPS PROVIDE an important part of the feed on every dairy farm. Hay crops provide relatively economical feed. New and better ways of putting up hay crops have been found. Farmers using the improved methods are getting better roughage at less cost, and are able to feed efficiently with less grain.

There are three practical ways of putting up hay crops. One is the customary method of field-curing. A second, which has become fairly popular with the spread of rural electrification, is partial field-curing followed by barn-curing (using an electrically powered blower arrangement). A third method, now being used by more and more farmers, is to make grass silage.

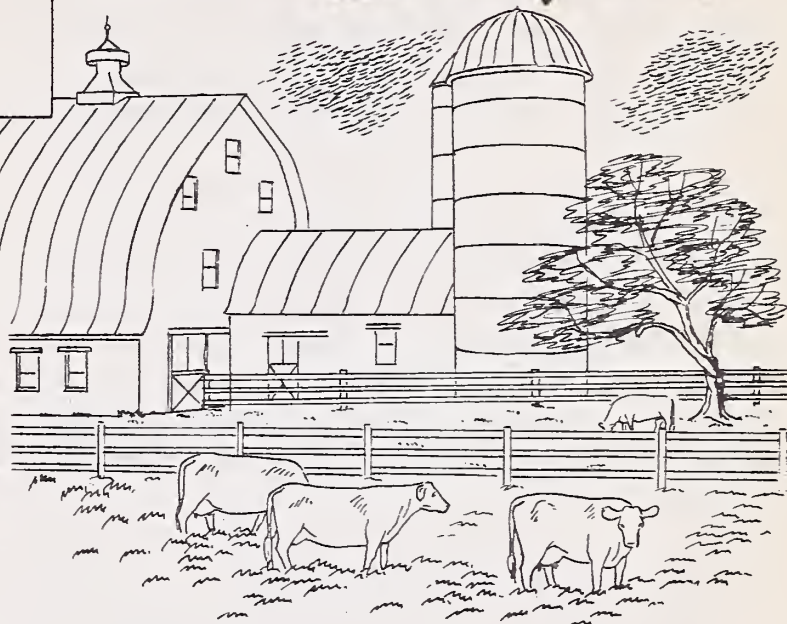
*The grass silage method shows up in tests as the best way to put up hay crops. Barn-curing shows up as next best. Field-curing gives the lowest return.*

A majority of farmers put up hay by the age-old method of curing it in the field. The door of opportunity is wide open, therefore, for most farmers to get more out of their hay crops by improving on their forage-preservation methods.

United States Department of Agriculture experiments show that field-cured hay, made during good weather, will lose as much as 25 percent of the dry matter and 30 percent of the protein found in the standing crop. If the crop is damaged by wet weather while curing, the losses may run as high as 40 and 45 percent, respectively. Barn-curing will reduce such losses by a few percent and give a better quality hay. The most outstanding results come from turning hay crops into silage, when such losses may be reduced to as little as 15 percent.

Here is a 3-point program that will help every farmer get the most from his hay land:

1. Use legumes or legume-grass mixtures.
2. Cut the crop early.
3. Make grass silage, if possible.



More than 70 million acres of hay crops are harvested annually in the United States. Hay production totals 90 to 100 million tons. This vast tonnage represents only a part of the feeding value of the fresh-cut crop. Enormous quantities of dry matter, protein, and other nutrients are lost through faulty methods of harvesting and storage. Some of the loss is unavoidable, but it could be reduced considerably by following modern hay-making methods. And losses could be reduced still more by making silage of all or part of the crop, particularly in humid regions or under other conditions where it is difficult to make good quality hay.

## Use Legumes or Mixtures

The first step in producing good roughage for dairy cows is to start with legumes or mixtures. Legumes, or mixtures of legumes and grasses, or mixtures of legumes and small-grain crops will usually make a more palatable and nutritious feed (either as hay or as silage) than the grasses alone or the small-grain crops alone.

Legumes such as alfalfa, red clover, or Ladino clover, grown in combination with timothy, or brome grass, or orchard grass are especially well suited for use either as hay or silage. Usually a small-grain nurse crop seeded in such combinations will provide a part of the forage harvested from the first year's growth.



## Cut Crop Early

Whether a crop is to be made into hay or into silage, it is important to cut it at an early stage of maturity—that is, before it becomes stemmy, dry, and otherwise unpalatable. Crops cut before they become mature are higher in protein content, have more green color and carotene (provitamin A), and less crude fiber than crops that are allowed to mature and form seed.

Much of the potential feeding value of the hay crops is lost every year by delaying cutting time too long.

Early-cut crops are leafy. The leaves contain most of the protein, carotene, and other nutrients. When the crop is in the swath, the leaves dry faster than the stems and tend to shatter off if drying is carried too far. Exposure in the swath also causes rapid loss of green color and carotene. These losses can be reduced considerably by windrowing the crop before the leaves become dry enough to shatter, and by handling the crop carefully throughout. The side-delivery rake rolls the forage up and the leaves are protected so they dry more nearly like the stems.

*Grasses and small-grain crops should be cut after the heads emerge but before they bloom.*

*Alfalfa should be cut when it is from one-tenth to one-fourth in bloom.*

*Red clover and alsike clover should be cut at the half-bloom stage.*

*Soybeans and Lespedezas should be cut when the first seed pods have filled.*

## Making Grass Silage

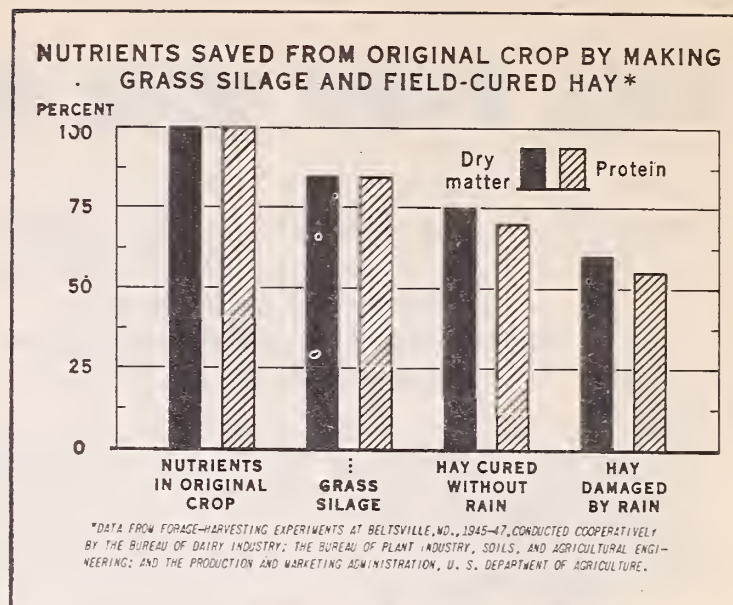
It often is possible to make good silage from hay crops when weather and other conditions make it difficult or impossible to make good quality hay. Crops require less drying time in the field for silage than for hay, which makes it easier to avoid damage from sudden showers or loss of leaves from too much drying. A farmer who plans to make hay, but who is also prepared to make silage if rain threatens, can often save a crop after it is down by running it into the silo.

Heavy first cuttings and weedy crops are often difficult to make into satisfactory hay, but such crops usually can be made into palatable and nutritious silage.

Ungrazed portions of the pasture, or surplus pasturage, can be harvested and run into the silo along with the regular silage crop. This not only saves feed that might otherwise be wasted, but also clears the pasture for new growth.

Losses of nutrients, from the time the crop is cut until it is fed, are less than half as much when the crop is preserved as silage rather than field-cured hay.

**Grass silage as a feed.**—Grass silage has a higher



protein and carotene content, and a lower crude fiber content, than field-cured hay made from the same field at the same time. The dry matter in grass silage is equal in feeding value (pound for pound) to the dry matter in the best quality of field-cured hay and is superior to the dry matter in poor quality hay.

Grass silage adds variety to the dairy ration. Variety encourages cows to eat more roughage, and then they require less grain. A little grass silage fed to animals on low-grade hay or dry pasture will provide the carotene (provitamin A) that otherwise would be lacking. When fed liberally to milking cows on winter feed, grass silage helps maintain summertime yellow color in the milk and a high vitamin A content.

Grass silage that is not too high in moisture content is as palatable as dry hay made from the same crop, and it can be fed to replace either hay or corn silage or both.

**Other advantages.**—Putting forage crops in the silo is the best way to carry over surplus feed from one year to the next, which is good insurance against short feed supplies in drought years.

Putting crops in the silo is an effective way to destroy the germinating power of weed seeds, which might otherwise be spread over the farm in manure.

Putting crops in the silo eliminates the possibility of fire, which sometimes results from spontaneous ignition of uncured hay in the mow.

Grass silage takes up less storage space than long hay, baled hay, or even coarse chopped hay.

Grass silage can be put in the empty silo or on top of any corn that remains, and since feeding can start within 30 days the silo may be emptied in time for corn in the fall.

When suitable machinery is on hand to make either grass silage or field-cured hay, there is little if any difference in the cost of harvesting and storing a crop by either method.



**How to make good grass silage.**—Although hay crops differ widely, they can all be made into good silage with little trouble.

There are two important things to keep in mind:

- 1. Air must be forced out of the silage and kept out.**
- 2. The chopped material must not be too moist.**

All crops will make more palatable silage if they are allowed to wilt slightly in the swath, but crops that have a high-protein content when cut *must* be wilted.

Crops such as the true grasses and small-grain crops, or mixtures of these crops with legumes, will be medium in protein content if they are cut *after* the heads are out. They can be put in the silo as soon as they are cut—in the same manner as corn or sorghum crops—if necessary, but they will make better silage if allowed to wilt a little.

Crops such as the legumes, or immature grasses, or small-grain crops that are cut *before* the heads are out, are all high in protein and *must be wilted* in order to produce good quality silage. When it is impossible to wilt these crops, they can be made less moist by adding dry chopped hay, corn-and-cob meal, or other dry grains as the crop goes through the cutter, or molasses may be added as a preservative.

Wilting is desirable with all hay crops, not only because it produces more palatable silage, but also because it reduces the weight to be handled, eliminates the need for a preservative, reduces the pressure on the silo wall, and eliminates seepage from the silo.

After many years of experience, the Bureau of Dairy Industry now recommends the following procedure in making wilted grass silage. It will consistently give good results under practical farm conditions if followed carefully.

**1. Silo should be airtight and have smooth walls.**—Air must be forced out of the silage and kept out. Otherwise, considerable moldy silage will result. Silo walls should be smooth so the silage will pack tight and pockets of air cannot form along the walls. Steel hoops on wooden-stave silos should be tightened before filling starts. The silo should have good drainage.

**2. Wilt the crop just slightly.**—The chopped material should have *not more than 68 percent of moisture and not less than 60 percent*. Very little wilting will be needed to reduce the moisture content to this point. The crop should be left in the swath or windrow only long enough for the leaves and stems to become limp; the leaves should not become dry or curled. On a good drying day, 1 or 2 hours of wilting will be enough unless the crop is very heavy or is immature. On very humid days,

a half day or a day may be required to wilt the crop sufficiently. During long dry spells, crops will usually be lower in moisture than normally. If cut at the best hay stage, they will be dry enough to put in the silo within a few minutes after cutting.

The crop should be mowed just far enough ahead so that at filling time it looks moist when twisted but shows no free moisture. At this stage the whole stems will twist in two. After chopping, the silage will feel cool and moist when rubbed between the hands, and will hold its shape but will not be dripping wet when pressed into a ball.

Scattered loads having as much as 70 percent moisture or as little as 55 percent may be put in the silo without causing any particular harm. If part of the forage gets too dry, it may be left for hay or may be run through the cutter with some freshly cut, unwilted forage. Forage that has wilted considerably should not be put in the upper part of the silo.

During rainy spells, the rain-wet portion of the crop can be siloed without wilting if filling is done slowly at the rate of 3 to 4 feet a day, without tramping, so that some heat will be generated. Or, it can be siloed at a normal rate by running 10 to 20 percent of dry hay, or 8 to 12 percent of ground dry grain, or 3 to 5 percent of molasses (by weight) through the cutter along with the wet crop.

**3. Chop the crop fine.**—The cutter should be set for the shortest cut available,  $\frac{1}{4}$  inch if possible. When the crop is cut fine it will pack quickly and closely, forcing out the air. Wilted crops *must* be chopped fine, otherwise air will be trapped in the silage and mold will form. The cutter knives and cutter bar should be kept sharp so they will cut cleanly and not shred.

**4. Distribute each load evenly in silo.**—By chopping the crop fine, distributing it evenly, and tramping each load thoroughly in the top part of the silo, more tonnage can be put in the silo and the added weight will help force the air out of the bottom part.

**5. Put 4 to 6 feet of heavy, unwilted, fine-chopped crop on top.**—This will complete the job of forcing the air out. No preservative will be needed in the wet top layer, since it will warm up naturally and produce mild palatable silage without any preservative.

**6. Keep the silage well tramped while it is settling.**—When filling is completed, level off the top but leave the silage slightly higher near the wall than at the center. Keep the material well tramped and packed tight against the wall for the first 3 or 4 days, when the silage will be settling most rapidly. Then tramp the edges twice a week for 2 or 3 weeks, keeping the silage packed tight against the wall until it has finished settling. This will seal out the air and also reduce the amount of top spoilage.

Heavy, reinforced, waterproof paper over the top of the silage also will help seal out air. The paper should be lapped 8 to 12 inches at the joints and against the wall, and covered with enough chopped green forage to keep it pressed tight against the silage and the wall. Even with this seal it will be necessary to tramp the silage next to the wall.

**Kind of silo.**—Good grass silage can be made successfully in any kind of silo, if proper care is taken to pack it well and keep the air out of the silage. Less loss will occur during storage in a permanent upright silo, or in a pit or semipit silo, than in other types. But good silage can be made in trench silos, and in temporary snow-fence or steel-fence silos lined with tough, reinforced waterproof paper.

### Using Grass Silage

Experiments at Beltsville and at a number of other experiment stations, and practical experience on many

farms, have shown that dairy cows will thrive on an all-silage roughage ration. Cows usually crave some dry hay in addition, however, and will eat more total roughage if a little dry hay is fed with the silage.

It is good practice, therefore, to put up some hay from the best fields during good curing weather. The hay should be fed along with grass silage to young calves, to high-producing cows, and to cows that do not consume silage liberally when it is fed as the sole roughage. It is particularly desirable to feed dry hay if the grass silage has a high moisture content.

In feeding trials at Beltsville, wilted alfalfa silage has consistently been more palatable than a good grade of alfalfa hay. The cows have produced as much milk or more, and they have made greater gains in live weight, when fed grass silage than when fed alfalfa hay. Calves fed wilted alfalfa silage consumed as much alfalfa dry matter after they were 90 days old and made larger gains in live weight than similar calves fed field-cured hay. Neither calves nor cows suffered from a lack of vitamin D, and no reproduction difficulties were noted in the cows.

